

Odour Risk Assessment & Proposed Control Measures for a Proposed New Poultry Processing Plant on the Former Maelor Creamery Site at Pickhill Lane, Cross Lanes, Wrexham



Report by: Steve Peirson

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Submitted to:
Guy Evans BSc (Hons) MSc MRTPI
Cassidy + Ashton
Cassidy House,
Station Road,
Chester,
CH1 3DW

Prepared by:
Steve Peirson BSc (Hons) CEng CEnv MIAgrE,
Principal Odour Consultant
ADAS UK Ltd
4205 Park Approach
Thorpe Park
Leeds
LS15 8GB

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Tel: 0113 2321630

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1. INTRODUCTION

This report has been prepared to provide an assessment of the potential odour impact risks of a proposed new poultry processing plant of the site of the former Maelor Creamery at Pickhill lane, Cross Lanes, Wrexham.

This assessment has been based on a review of the risks of odour generation from key parts of the proposed processing plant and the proposed odour mitigation measures set out in documents supporting the planning application, and specifically the Air Quality assessment and accompanying appendix.

This assessment has been based on the author's extensive consultancy and odour measurement experience at UK poultry slaughterhouses and processing plants operated by companies including Banham Poultry, Grampian, Padleys, Moy Park, O'Kanes, Two Sisters Food Group, Faccenda, Bernard Matthews and Sun Valley. This experience has included objectively measuring odour emissions and prioritising control measures at sites where unacceptable off-site odour impact has occurred as well as providing odour control solution specifications for new plants and plant extensions on existing sites.

This report has been commissioned to identify the key potential odour sources at the proposed development based on ADAS experience of similar facilities, and to provide an assessment of how effectively odour emissions will be mitigated, along with a commentary on the residual risks of adverse odour impacts with suitable mitigation measures in place.

2. ODOUR SOURCES AT THE POULTRY PROCESSING PLANT

The key potential sources of odours at poultry processing plants are set out in tabular format below in Table 1 with an explanation of the potential for odour emissions, the engineering and management controls which can be used to limit odour emissions, and the specific controls proposed for the plant proposed for the Maelor site. Table 1 also provides an assessment of the risks of adverse odours for each area of the plant with and without appropriate odour mitigation measures.

As an overview, the following paragraphs summarise the key issue and controls required for the main areas of the plant:

- a) **The Lairage.** Lairage area holds live birds in modular “crates” prior to slaughter and as such generate relatively low levels of odour emissions. Odour concentrations in the emissions are low such that emissions are normally mitigated by atmospheric dispersion within separation distances of 50m to 200m. This means that there is normally little risk of any adverse off-site odour impacts even without mitigation, but in this case the Applicants propose extracting air from the Lairage and passing the extracted air through a scrubbing abatement system, so that the risk of adverse off-site impacts will be further controlled. There is therefore low to very low risks of any adverse impact.
- b) **Preliminary Processing Areas.** Birds are stunned, slaughtered and bled prior to further preparation. Odour emissions from these areas are very low because there are small numbers of birds in these areas at any one time and because there are no significant changes to the state or composition of the chickens. It is also noted that fresh blood has no significant odour. These areas of the plant have low potential to cause off-site odour impacts, but again the Applicants/Operators are proposing to enclose and extract these areas of the plant to abatement plant to further reduce the risks of causing adverse off-site odour impacts
- c) **De-feather and Evisceration.** Providing that offal, wastes and effluent elsewhere in processing plants are well managed, then ADAS has consistently

found that the highest odour risk area of processing plants is the de-feather area. The chickens pass through hot water in scald tanks and then pass through plucking machinery. Scald tanks generate odours as solid organic materials from the birds accumulates and degrades in the water and this causes odour emissions in “steam” from the tanks and off the birds as they leave the tanks. It is therefore absolutely critical that de-feather areas are subject to containment and extraction of air to odour mitigation, such as a scrubber, a biofilter or a very tall dispersion stack. In this case the Applicant proposes to use a chemical scrubbing system to abate extracted emissions, so that off-site impacts will be controlled.

Evisceration involves removal of the birds’ intestines and other internal organs (heart, lungs livers etc.) but does not generate significant emissions of odours as the intestines are not broken. Experience elsewhere shows that odour emissions can be satisfactorily mitigated simply by extracted air being dispersed to atmosphere through high level (roof mounted) extraction fans. However, again in this case the Applicants have proposed a precautionary approach with extracted emissions abated by a scrubbing system.

There are no further significant sources of odours from chicken carcasses after evisceration.

- d) **Offal, Feathers and By-Products** - Odour potential ranges from low or very low (e.g. gut contents and fresh offal, skins etc. straight after slaughter) through to highly offensive (at worst with stored blood in warm weather). The most important mitigation measures are prompt daily removal of putrescible wastes, cleanliness of floors and offal handling equipment, complete enclosure of all offal and by-product storage, and full enclosure of waste collection vehicles (or skips or trailers) during loading and “standing” on site. These are all measures that can be specified and managed within the terms of an approved Odour Management Plan.

Significant reductions in the odour emissions from stored blood are achievable by chemical treatment or by refrigeration, but complete enclosure of storage tanks and odour extraction to abatement remains the main approach to

provide effective odour control for potentially sensitive sites.

At this site the Applicants propose that potentially odorous materials will be removed from site every day and the collecting and storage areas will be enclosed and extracted to odour abatement. These measures will, together with appropriate extraction rates and the proposed scrubber abatement of extracted air, provide a low risk of any adverse off-site odour impacts,

- e) **Waste water and effluent storage/treatment.** Effluent is generated predominantly as contaminated wash water from the abattoir generally and from the de-feather areas.

As with offal and by-products, good house-keeping plus “controlled” storage (covered and extracted to abatement) of high risk materials (sludges and solids separated from the effluent) are critical factors in controlling odour emissions. Early screening and separation/removal of high risk materials from effluent reduces the odour potential of effluent during any further treatment.

The key odour risks are:

- i) Any effluent balance and storage tanks (which are used to provide a buffer between the sources of effluent and treatment), and
- ii) Storage and handling of sludges and solids removed from the effluent as a part of preliminary effluent treatment.

The key control measures are enclosure of all effluent tanks and processing areas, and extraction of air to, in this case, the proposed scrubbing system.

- f) **Odour Abatement Scrubber** – Chemical scrubbing systems are now being adopted as Best Available Technology (BAT) for the treatment of odours from chicken processing plants in England and Wales. For example, at the Moy Park plant at Ashbourne a new sodium hypochlorite/caustic soda scrubbing system has been successfully used to control nuisance and odour impact from the enlarged processing plant following a recent extension in processing facilities. At the Ashbourne site there had previously been complaints from

residents who live just over the plant boundary and a few tens of yards from the plant itself. The new scrubbing system has controlled odour complaints despite the fact that the extension has effectively further reduced the separation distance between residents and the processing plant.

3. KEY CONTROL MEASURES

Control measures such those set out below can be used to provide very effective mitigation of chicken slaughterhouse odour emissions in sensitive locations:

1. De-feather areas must be fully enclosed and extracted air ducted to suitable mitigation (a very tall stack or a scrubber or biofilter).
2. All feathers, offal and by-products must be kept either within fully enclosed and extracted areas (buildings) or chilled and held within refrigerated stores at all times whilst on site. These solid “waste” materials must normally also only be loaded into collection trailers, skips or lorries within fully enclosed areas and should be removed from site on a daily basis before odorous decay sets in. Offal storage areas (unless refrigerated) and offal collection areas should be subject to extraction ventilation, and the extracted air then subject to odour mitigation (in this case a scrubber).
3. All blood, together with sludges and fats that are separated from effluents (typically by dissolved air flotation or DAF plants), must be kept in covered tanks with extraction and odour abatement of extracted air by treatment with carbon filters, a biofilter or chemical “scrubbing” or some equally effective alternative.
4. All vacuum tankers collecting blood and sludges should “back vent” displaced air from their vacuum pumps should be ducted through flexible hoses back into the on-site tank extraction and abatement system.
5. Any on-site effluent/washwater balance tanks should be fully enclosed and odour extracted to suitable odour abatement/arrestment equipment unless an effective aeration or chemical treatment system is used to prevent septicity and thereby to mitigate odour emissions.

6. Any effluent solids separation equipment, such as screens or DAF tanks, used to provide preliminary effluent treatment should be enclosed and enclosures extracted to odour abatement or arrestment equipment as necessary to prevent fugitive odour emissions.
7. All odour control measures and their monitoring, management and maintenance requirements should be set out within an Odour Management Plan (OMP) document. The scope and contents of OMPs are now quite routinely subject to planning authority approval as part of planning conditions, so that an OMP has to be approved before plant is brought into use.

Table 1 below sets out how these, and other measures are proposed to be incorporated into the design of the proposed plant and how they will address the risks of adverse odour impacts.

Table 1 MAELOR POULTRY LTD – Potential Key Odour Sources & Proposed Controls

Source	Type of Smell	Frequency & Duration	Management Controls	Engineering Controls	Odour Risk	Planned Mitigation
1. Lairage	Chicken related, “sweet-ish” but generally low strength. Likely to be very localised	Daily, but should only be while chickens are on site. Chicken odours may be noted as a transient odour from passing curtain-sided HGVs delivering live chickens to site	Daily washing down of chicken droppings from lairage areas. Washing down HGVs after unloading An Odour Management Plan (OMP)	Building with some wall wind shelter or cladding. Good ventilation is essential to keep birds cool in hot weather, probably with fans and misting	Generally low or very low risk unless very large plant in very close proximity to sensitive receptors.	Normally no specific measures required other than optimising dispersion of extracted air, but in this case the Operators propose air extraction to a scrubbing system.
2. Stunning, Bleeding & Blood Storage	Fresh blood has negligible odour. Stored blood rapidly decomposes to produce very strong and unpleasant odours in warm weather if held on site for more than 24 hours.	Bleeding is continuous during production hours. Emission of storage odours will depend on how long blood is stored on site and season/temperature. Short term peaks of odour if blood loaded to vacuum tankers for removal from site. (15-20 mins)	Frequent removal of blood from site (every day). Tanks must be thoroughly emptied An Odour Management Plan (OMP)	1. Containment in covered blood storage tanks and extraction of headspace air to abatement by carbon filter, chemical scrubber or biofilter 2. Hopper bottomed blood tank to facilitate drainage and cleaning of tank.	Bleeding – low risk Storage of blood- Potentially high or very high , but can be very readily reduced to low risk by extraction of air from blood tank and abatement	Blood storage tank to be vented through activated carbon filter. <u>Blood to be removed from site every day</u> Hopper bottomed blood tank to facilitate drainage and cleaning of tank. Blood collection tankers to be back vented through extraction and scrubbing system.

Operation or Odour Source	Type of Smell	Frequency & Duration	Management Controls	Engineering Controls	Odour Risk	Planned Mitigation
3. Scald Tanks & De-feather This is potentially the single most important odour source on sites where blood and offal odours are otherwise well controlled.	Varies from chicken droppings and hot feathers (might be sweetish) through to a quite unpleasant decaying chicken odour later in each day.	Odour builds up on each production day as organic residues accumulate & decay in the hot water “scald tanks” through which all freshly slaughtered birds traverse. Short term peak at end of each day when tanks are emptied.	Good hygiene Careful “disposal” or treatment of spent water when tanks are emptied. Partial drainage of water with settled solids and topping up with clean water during day	Scald room must be ventilated to control build-up of steam & condensation dripping off roof. There are two proven solutions: 1. Extraction to a high level stack (to disperse). - or 2. Extraction to biofilters or a chemical scrubber	Potentially high to very high with close receptors. Risk controlled to low or very low by use of a chemical scrubber or biofilter to abate odours, and/or by dispersing odour through a tall stack	Operators propose installing an air extraction system with extracted air treated by a chemical scrubbing system.
4. Feather Storage & Collection	From low intensity warm “wet feather” odours if fresh, through to extremely unpleasant rotting or sulphidic odours if stored on site for more than a day or two.	If removed from site on a daily basis then odours should be cyclical and low level. Feather trailers typically have a “water” drain to reduce weight, and drainage “water” can be odorous.	Daily removal from site. Good hygiene and cleaning of storage areas and of containers. Extraction to a tall stack or abatement system helps prevent fugitive emissions	Containment in buildings is most common. Good drainage from collection and storage areas. Extraction from contained storage areas to abatement (e.g. biofilter or scrubber).	Potentially high if not removed frequently. Otherwise low with extraction and abatement to medium risk (natural ventilation)	Operators propose installing an air extraction system with extracted air treated by a chemical scrubbing system. Feathers will be removed from site every day

Operation or Odour Source	Type of Smell	Frequency & Duration	Management Controls	Engineering Controls	Odour Risk	Planned Mitigation
5. Evisceration	Low intensity visceral odours, and not as unpleasant as might be expected	Daily during production	Good hygiene routines to keep evisceration area clean. Daily removal of offal and by-products	Extraction to open topped roof mounted fan stacks would be typical with no abatement required	Low with or without mitigation measures	Operators propose installing an air extraction system with extracted air treated by a chemical scrubbing system.
6. Offal Storage & Collection	From low intensity warm and visceral odours if fresh through to extremely unpleasant rotting meat odours if stored for more than a day or two. (rate of decay is temperature related	If removed from site on a daily basis, then odours should be cyclical and of low intensity. If stored on site will reach a short term peak during disturbance.	Daily removal from site. Good hygiene and thorough cleaning in storage areas, and of containers. .	Containment in buildings is most common. Good drainage from collection and storage areas. Extraction from enclosed storage areas to abatement (e.g. biofilter or chemical scrubber). Or dispersion through a tall stack	Potentially high to very high if not removed frequently, and especially if stored outside or uncovered Otherwise low risk if material is removed from site daily and if storage areas are extracted to abatement.	Offal and by-products will be removed from site every day Collection and storage areas will be enclosed and the Operators propose installing an extraction system with extracted air treated by a chemical scrubbing system.

Operation or Odour Source	Type of Smell	Frequency & Duration	Management Controls	Engineering Controls	Odour Risk	Planned Mitigation
7. Effluent Treatment & Sludge with a “Dissolved Air Flotation” or DAF effluent separation system Effluent may be stored in a balance tank to even out flow to treatment	Odour can be very unpleasant if there are anaerobic or septic conditions in balance tanks, sumps or pits and sludge tanks If there is a DAF (dissolved air flotation) unit, then resulting sludge & other separated solids (e.g. from feather/solids screens) are highly putrescible.	Variable. Odours may increase during the week if effluent or dirty water is held in a balance tank. Balance tanks are used to smooth the flow from peaky sources (such as daily emptying of the scald tanks) to effluent treatment plant, for example until the treatment plant “catches up” overnight after daily peak flows. DAF sludge tanks (from a DAF unit if used) can generate odours, peaking when emptied or disturbed in the same way as blood tanks.	Good hygiene, cleaning and maintenance procedures.	Covering tanks (with extraction to abatement such as a biofilter or a scrubber). Effective preliminary separation of solids upstream of effluent treatment to avoid odorous solids getting into tanks and pits where odours may then result. Extraction of air from effluent treatment areas and effluent and sludge tanks to abatement system (biofilter or scrubber)	Medium to High risk without appropriate controls. Low risk with suitable containment and extraction from all effluent and sludge processing facilities and tanks to abatement by a scrubber.	The Operators propose installing an air extraction system with extracted air treated by a chemical scrubbing system. DAF sludge tank to be covered and extracted to abatement system
8. Carcase handling, grading, packing and loading out.	Negligible odour from chilled birds and packed products.	No odour concerns	None	Chilling and refrigeration	Negligible	None

4. CONCLUSIONS

Experience elsewhere has shown that the most critical odour control measures are those required to provide covered/enclosed and odour extracted facilities for the scald tank and de-feather area and also for the storage and handling of blood, feathers, offal and separated sludges/solids (from effluent treatment plants). The proposed development includes provision to control and mitigate emissions from these areas of the plant

With the proposed odour mitigation measures in place the residual risks of unacceptable off-site odour impacts would be very low with the proposed process containment together with appropriate air extraction rates and abatement plant performance.

5. RECOMMENDATIONS

All offal, feathers, by-products and blood should be removed from site on a daily basis or chilled and stored under refrigeration.

All offal, by-products, feather collection, storage and loading areas, and effluent treatment plant areas should be fully enclosed and odour extracted at rates equivalent to at least three room/building air changes per hour.

Scald tank/de-feather areas and lairage areas should be extracted at higher rates (than three air changes per hour) to provide satisfactory working/hygiene conditions and bird welfare conditions respectively.

Odour dispersion modelling should be used to objectively determine performance specifications for the odour abatement scrubber taking account of the required air extraction rates and the emission release height.

An Odour Management Plan should be drafted and approved (via discharge of a planning condition by the planning authority and via an application to Natural Resource Wales for a Permit to operate in accordance with the Pollution Prevention

and Control Regulations) before the proposed plant is brought into use.

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